

ABSTRACT

The present invention relates to compositions and methods for the production of Betaine lipids. The methods of the present invention comprise the expression of recombinant enzymes (*e.g.* from *Rhodobacter sphaeroides*) in host cells (*e.g.* bacteria, yeast, and plants) to produce
5 Betaine lipid compounds including, but not limited to, Diacylglyceryl-*O*-4'-(*N,N,N*, -trimethyl) homoserine (DGTS). The methods and compositions of the present invention may be utilized such that the amount of phosphate containing fertilizer required for the growth of a particular plant is decreased.